

## **REMARKS**

This is a Supplemental Amendment which is responsive to the Official Action of March 27, 2002, the Office communication of December 16, 2002 and the further Office communication of March 4, 2003.

Applicant respectfully submits that the last two Official Actions are clearly in violation of the provisions of 35 U.S.C. §§132 and 133. As understood, the last two Official Actions did not provide Applicant an opportunity to persist in his claim for a patent and with or without amendment, the Application should have been reexamined to start with based on the Amendment filed September 27, 2002 or should have been given a period of time of not less than thirty (30) days in which to persist for his claim for a patent. Indeed, on page 12 of the Amendment, a specific request was made for further consideration and reexamination of the Application in view of 35 U.S.C. §132 and regulations in implementation thereof. Indeed the paragraph bridging pages 12 and 13 of the Amendment of September 27, 2002 was, in itself, a sufficient reply for the purpose of 35 U.S.C. §132. Although Applicant is seeking redress at present through the provisions of 37 CFR §1.137(b), Applicant does not waive any other defense or action or make any concessions which will prevent the instant Application from being restored to a pending status. For example, without limitation, Applicant respectfully objects to the requirements of having to present a new figure or otherwise to illustrate in one manner or another all components in the claims. This is not a requirement for PCT applications of which the instant Application is a continuation or in patent applications which are chemical in nature or otherwise under applicable international conventions.

In the Official Action of March 27, 2002, the drawings were objected to under 37 CFR §1.83(a). It is stated that the drawings must show every feature of the invention specified in the

claims. Therefore, it is further stated that the caterpillar track, the orientation means, the guidance means, a compass, a gyroscope, an air level device, a clinometer, a circular element comprising a wheel, a disc, a sphere, protective facilities comprising a sensor for detecting cows, a positioning means, a signal producing means, a brush, a spraying unit, a bracket, and anti-bumping sensor must be shown on the features cancelled from the claims. Of the various named items, a circular element comprising a wheel 9 is clearly set forth in the Detailed Description of the Preferred Embodiments in paragraph 1 thereof. The same is true of the anti-bumping sensor 7 which can be seen at the bottom of bumper 6 in Figure 4. Further that the bumper 6 as shown in Figure 4 may also be considered appropriately as a bracket seems clear. This Amendment has modified the description to such effect. It will also be noted that this is set forth, in effect, in the last paragraph of the Summary of the Invention on page 6 of the original Substitute Specification. Although Applicant is submitting a proposed Figure 5 that shows the caterpillar track, certainly one skilled in the art would understand the position and purpose of the caterpillar track in Figures 1-4 as originally submitted. The other elements which it is stated must be shown in the drawings are essentially off-the-shelf mechanisms which would be readily known and available to those skilled in the art to whom the description of the invention is directed under 35 U.S.C. §112. Not only are the use of compasses, accelerometers and gyroscopes well known for use in moving crafts such as airplanes and seagoing vessels, their use on agricultural equipment is also well known. Precision-farming wherein such items are used on a daily basis is part of the state of the art as well as well known in the prior art. A wealth of information concerning the various items which are objected to in the Official Action is available via Internet access as well as being disclosed in farm oriented magazines. Precision-farming techniques are used by individuals not only across the United States, but also worldwide. An earnest attempt has been

made to mention the various mechanisms and sensors which can be incorporated in the unmanned vehicle of the instant invention. But, it will be noted that it is a combination of the various precision high-tech items with the instant invention that, in effect, is claimed, not these high-tech items as such. They are well known in the art.

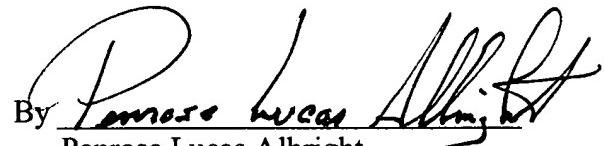
Insofar as the rejection under 35 U.S.C. §112, first paragraph, is concerned, although, it might help, one skilled in the art does not have to be a rocket scientist to enable such person to use the subject matter submitted in subject Application to make and use the invention. Devices such as gyroscopes, compasses, air level devices, clinometers, accelerometers, are used as part and parcel with orientation means. As the undersigned dictates this, he has a light outside of his office, purchased many years ago, which indicates when a person or other large object gets near steps leading to his office. In the same manner, any dairy farmer or, almost any farmer that raises animals, can provide information on how manure displacing means operates or how it may also comprise a brush or a spraying unit. In this particular case, the manure displacing means, as such, is not indispensable for supporting a vehicle to which it is applied, manned or unmanned, while it is operating. However, the manure displacing means is used uniquely for that purpose in the instant invention and it is an important aspect of the invention inasmuch as it permits the weight of the vehicle to be applied downwardly on the manure displacing means, thus making it more effective while, at the same time, improving control of the vehicle with a need for only two rotating ground engaging members such as wheels or caterpillar tracks. It should be apparent to those skilled in the art as to how the manure displacing means provide support for the vehicle while it is operating from the drawings alone without even having to review the written disclosure of the Application. It will be noted that practically all of the independent claims, with the exception of Claim 117, require that the manure displacing means provide support for the

vehicle while it is operating. This is not shown in the prior art. Concerning Claim 117, it is directed to subject matter of the unmanned vehicle, as such, by language which avoids the prior art of record. Thus Claim 117 avoids the references of record and as such, should also be considered patentable and allowable.

For reasons set forth in the Amendment filed September 27, 2002 and as amplified herein and as, in any event, should be well within the skill of the art, it is submitted that the invention as claimed in the instant Application clearly meets the criteria of the patent statutes of the United States, the Office communications of December 16, 2002 and March 4, 2003 are invalid and should be withdrawn, as such, and the Application should be allowed with the claims currently presented and passed to issue, subject, of course, to the filing of formal drawings including the informal drawing for Figure 5 attached hereto.

Respectfully submitted,

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SECOND

PATENT

SUBSTITUTE SPECIFICATION OF PCT/NL00/00313  
INVENTOR: KAREL VAN DEN BERG  
TITLE: AN UNMANNED VEHICLE FOR DISPLACING MANURE

AN UNMANNED VEHICLE FOR DISPLACING MANURE

RELATED APPLICATION:

This Application is a Continuation Application of International Application No. PCT/NL00/00313, filed May 10, 2000.

FIELD OF INVENTION:

This invention relates to an unmanned vehicle for displacing manure.

BACKGROUND OF THE INVENTION:

Modern stables have a stable floor which is provided with apertures that receive through them cow manure. A receptacle is provided under the stable floor in which manure that passed therethrough is collected. Generally there is also provided in the stable a so-called manure slide which moves through the stable at predetermined times and displaces the manure partially to the dung pit and partially through the apertures in the stable floor.

A new development is an unmanned vehicle for displacing manure. Such a vehicle is known from, for example, Messrs. Joz B.V. as the JOZTECH (Landbouw Rai (Agricultural Rai), Amsterdam, January 1999). This vehicle is provided with a propelling unit comprising two freely rotatable wheels and one driven and controllable wheel. The disadvantage of said vehicle is that the construction of the driven and controllable wheel is complicated and therefore expensive. Moreover, the vehicle is very sensitive

to dirt, which is not desirable in an environment such as a stable. Furthermore, the JOZTECH is driven by only one controllable wheel, whereby wheel skidding often occurs on the stable floor which is very slippery due to the presence of manure. As a result thereof it is not possible to determine the exact position of the vehicle on the basis of the number of revolutions of the driven wheel. Finally, the manure slide exerts relatively little pressure on the stable floor~~x~~ so that not all the manure is displaced by the manure slide and part of the manure moves under the lower side thereof.

**SUMMARY OF THE INVENTION:**

An object of the invention is to obviate the above-mentioned drawbacks by fitting the manure displacement means to the unmanned vehicle so it is indispensable for supporting or propelling the vehicle or both. The invention further relates to an unmanned vehicle wherein its steering comprises a propelling unit that includes at least one propelling member. The advantage of this unmanned vehicle is that the manure displacement means forms part of the supporting means, as a result of which a considerable part of the weight of the unmanned vehicle always bears on the manure displacement means, whereby sufficient pressure always bears against the stable floor, whereupon the manure is effectively displaced over the stable floor and is received through the apertures in a stable floor. Moreover, the drive unit of the propelling members also constitutes the steering unit of the unmanned vehicle. Accordingly, a compact construction is achieved

which is insensitive to dirt and which, in addition, is less complicated thus reducing manufacturing costs.

According to an inventive feature, the unmanned vehicle comprises a steering unit which is constituted by the propelling unit which comprises at least one rotatable propelling member. In this manner ~~there is obtained~~ <sup>is provided</sup> a particularly compact vehicle which has excellent maneuverability. According to another embodiment of the invention, the vehicle comprises a steering unit which is constituted by the propelling unit which comprises at least two independently driven propelling members. In this embodiment maneuverability of the vehicle is possible by varying the peripheral velocities of the propelling members. The propelling members may comprise a wheel or a caterpillar track or both. Caterpillar tracks have the advantage of being less sensitive to skidding than wheels.

In accordance with another inventive feature, the unmanned vehicle is equipped with orientation means for following a path in a space for determining the position of the vehicle in a space, such as a stable or a meadow. The orientation means comprise floor detection means for detecting apertures in the floor or detecting a <sup>guide</sup> ~~guide~~ means in the floor, such as the reinforcement in the concrete or an electricity conducting wire or a combination thereof. The apertures in the floor are usually provided for removing the manure as described above. When the stable floor is made of concrete, there is usually a metal grid in the floor to give it extra strength. Said grid can be detected by means of the

floor detection means with the aid of, for example, an induction coil. Additional orientation means may comprise a compass or a gyroscope or an air level or a clinometer or an acceleration meter, or a combination thereof. These orientation means are currently available in a form which is suitable for being applied in electronic circuits, so that integrated orientation means can easily be assembled from the various components.

Besides, the orientation means also comprises wall following means for detecting and following a wall, such as a fixed stable wall or the edge of a cubicle. These wall following means extend over at least part of the circumference of the unmanned vehicle. The wall following means may also be disposed on the manure displacing means. In a preferred embodiment, the wall following means consists of a freely rotating substantially round element, such as preferably a wheel or a disc or a sphere or a combination thereof.

Furthermore, the invention relates to an unmanned vehicle which is equipped with orientation means for following a path in a space or determining a position of the vehicle in a space, such as a stable or a meadow. It will be appreciated, moreover, that the unmanned vehicle is not only capable of being used for displacing manure, but also for other activities, such as spreading material, such as sawdust and straw, determining and controlling the climate in the stable, and determining the behavior and health of the animals. For that purpose the unmanned vehicle is equipped with orientation means comprising floor detection means for

detecting apertures in the floor or detecting a guide means in the floor, such as the reinforcement in the concrete or an electricity conducting wire or for detecting a combination thereof. Moreover, the orientation means may also comprise a compass or a gyroscope ✓ or an air level or a clinometer or an acceleration meter or a combination thereof. The orientation means may also comprise wall following means for detecting and following a wall, such as a fixed stable wall or the edge of a cubicle. The wall following means extend preferably over at least part of the circumference of the unmanned vehicle. The wall following means may also be disposed on the manure displacement means. The wall following means may consist of a freely rotating, substantially round element. The round element is preferably constituted by a wheel or a disc or a sphere or a combination thereof.

According to another inventive feature, the unmanned vehicle is equipped with protective facilities for protecting the vehicle from colliding with obstacle, such as ~~the~~ <sup>of cows</sup> cow's legs, or fixed objects, such as supporting pillars in the stable.

The protective facilities may comprise a bumper or a sensor for detecting cows, or both. The protective facilities may also comprise wall following means or positioning means for determining the position of an obstacle relative to the unmanned vehicle. The positioning means may comprise a clinometer or an acceleration ~~means~~ <sup>meter</sup> or both. The positioning means are preferably disposed on the wall following means. In this manner it is possible to determine the angular deflection and angular acceleration of, for

example, the wall following means, so that information is obtained regarding the position of the obstacle. The signal from the positioning means is used for actuating the steering unit.

The manure displacement means preferably comprises at least one brush or at least one manure slide or at least one spraying unit or a combination thereof.

In accordance with a yet further inventive feature, the unmanned vehicle is equipped with anti-bumping means for preventing the manure displacement means from moving too far away from the floor. The anti-bumping means comprises a bumper or a bracket or both. The anti-bumping means preferably comprises an anti-bumping sensor for detecting the movement of the manure displacement means relative to the floor, which anti-bumping sensor is coupled to be propelling unit. Such anti-bumping sensor may consist of a switch which is disposed on the bumper or bracket. When the manure slide moves too far away from the stable floor, the switch touches the stable floor, whereupon the unmanned vehicle is caused to move in an opposite direction until all its supporting means bear on the stable floor.

**BRIEF DESCRIPTION OF THE DRAWINGS:**

The invention will now be explained in further detail with reference for the accompanying drawings;

Figure 1 is a plan view of the unmanned vehicle comprising one rotatable propelling member;

Figure 2 is a side elevational view of the unmanned vehicle of Figure 1 that comprises one rotatable propelling member;

Figure 3 is a plan view of the unmanned vehicle comprising two independently driven propelling members; ~~and~~

Figure 4 is a side elevational view of the unmanned vehicle of Figure 3 that comprises two independently driven propelling members; and Figure 5 is a view similar to Figure 2 to indicate the presence of components not described herein but not otherwise shown in the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS:

The unmanned vehicle as shown in Figures 1 and 2 consists of a frame 1 which is provided with a propelling unit 2 and a manure slide 3. The steering unit of the unmanned vehicle is constituted by propelling unit 2, which propelling unit 2 comprises a rotatable wheel 4. As shown in the drawings, a particularly compact vehicle is provided which has moreover an excellent maneuverability. On frame 1 are also disposed a wall following means 5 which, in this embodiment, comprises a wheel 9 which is freely rotatable about a vertical ~~axis~~ <sup>axle</sup> 8.

When operating, the vehicle is propelled by wheel 4. When ~~the~~ wall following means 5 touches an obstacle, such as a cow's leg, this results in a resultant force on the vehicle, which causes the vehicle to travel around the obstacle. Wall following means 5 may also be used for following a wall. In that case the vehicle is constantly caused to travel a direction towards the wall. Subsequently there is exerted by the wall a reactive force on the wall following means in the direction away from the wall. As a result thereof the vehicle travels in a straight line along the wall, while wall following means 5 remains in contact with the wall.

Figures 3 and 4 show another embodiment of its unmanned vehicle, in which parts corresponding to those of the first embodiment are indicated by the same reference numerals. The vehicle is furthermore provided with a bumper 6 which not only protects the vehicle against obstacles, but also ensures that <sup>bracket or</sup> scraper or manure slide 3 does not move too far away from the stable floor. An anti-bumping sensor 7 is disposed on <sup>bracket or</sup> bumper 6 for detecting movements during which the manure slide moves away from the stable floor.

The way of moving and functioning of wall following means 5 is identical to that described with reference to the embodiment shown in Figures 1 and 2. Maneuvering the vehicle is possible by varying the drive torque or the peripheral velocity of wheels 4. When the anti-bumping sensor 7 detects that the manure slide 3 has moved away from the <sup>underlying surface (which, if necessary, will)</sup> ground, the unmanned vehicle is caused to move in an opposite direction. In practice the anti-bumping sensor 7 may be constituted by a switch which is connected to propelling unit 2 so that the propelling unit causes the vehicle to move in an opposite direction in order to prevent the vehicle from bumping.

Although I have disclosed the preferred embodiments of my invention, it is to be understood that it is capable of other adaptations and modifications within the scope of the appended claims.

Figure 5 is similar to Figure 2, but includes components that although described herein, are not otherwise indicated in the drawings. Here propelling unit 5 comprises a caterpillar track 4. Instead of a SCRAPER or manure slide 3, a brush 3' is provided which may also represent a spraying unit. Wall following means 5 comprises a disc 9'. An orientation and positioning means 10 may be associated with the vehicle in any manner considered appropriate and correct by one skilled. It consists of a gyroscope, accelerometer, compass, air level device, clinometer, a sensor for detecting cows, or any combination thereof.

(anti-bumping formed  
not to protect  
but to move manure to the vehicle)  
Original drawing